Trash Total Maximum Daily Loads

for the

Los Angeles River Watershed

~~January 25, 2001~~
June 18, 2001

California Regional Water Quality Control Board
Los Angeles Region
320 West Fourth Street
Los Angeles, California 90013

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I. Introduction – Legal Background

The California Regional Water Quality Control Board, Los Angeles Region (hereinafter referred to as the "Regional Board") has developed this total maximum daily load (TMDL) designed to attain the water quality standards for trash in the Los Angeles River. The TMDL has been prepared pursuant to state and federal requirements to preserve and enhance water quality in the Los Angeles Basin River Watershed.

The California Water Quality Control Plan, *Los Angeles Region*, also known as the *Basin Plan*, sets standards for surface waters and groundwaters in the regions. These standards are comprised of designated beneficial uses for surface and ground water, and numeric and narrative objectives necessary to support beneficial uses and the state's antidegradation policy. Such standards are mandated for all waterbodies within the state under the Porter-Cologne Water Quality Act. In addition, the Basin Plan describes implementation programs to protect all waters in the region. The Basin Plan implements the Porter-Cologne Water Quality Act (also known as the "California Water Code") and serves as the State Water Quality Control Plan applicable to the Los Angles River, as required pursuant to the federal Clean Water Act (CWA).

Section 305(b) of the CWA mandates biennial assessment of the nation's water resources, and these water quality assessments are used to identify and list impaired waters. The resulting list is referred to as the 303(d) list. The CWA also requires states to establish a priority ranking for impaired waters and to develop and implement TMDLs. A TMDL specifies the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and allocates pollutant loadings to point and non-point sources.

The United States Environmental Protection Agency (USEPA) has oversight authority for the 303(d) program and must approve or disapprove the state's 303(d) lists and each specific TMDL. USEPA is ultimately responsible for issuing a TMDL, if the state fails to do so in a timely manner.

As part of California's 1996 and 1998 303(d) list submittals, the Regional Board identified the reaches of the Los Angeles River at the Sepulveda Flood Basin and downstream as being impaired due to trash.

A consent decree between the USEPA, the Santa Monica BayKeeper and Heal the Bay Inc., represented by the Natural Resources Defense Council (NRDC), was signed on March 22, 1999. This consent decree requires that all TMDLs for the Los Angeles Region be adopted within 13 years. The consent decree also prescribed schedules for certain TMDLs. According to this schedule, a Trash TMDL for the Los Angeles River watershed must be approved before March 2001.

This Trash TMDL is based on existing, readily available information concerning the conditions in the Los Angeles River watershed and other watersheds in Southern California, as well as TMDLs previously developed by the State and USEPA.

II. Definitions

The definitions of terms as used in this TMDL are provided as follows:

Baseline Waste Load Allocation. The Baseline Waste Load Allocation is the Waste Load Allocation assigned to a permittee before reductions are required. The progressive reductions in the Waste Load Allocations will be based on a percentage of the Baseline Waste Load Allocation. The Baseline Waste Load Allocation will be calculated based on the annual average amount of trash discharged to the storm drain system from a representative sampling of land use areas, as determined during the Baseline Monitoring Program.

Daily Generation Rate (DGR). The DGR is the average amount of litter deposited to land or surface water during a 24-hour period, as measured in a specified drainage area.

Full Capture Device. A full capture device is any device or system ~~which~~ that traps all particles retained by a 5 mm mesh screen and has a design treatment capacity of not less than the peak flow ~~during~~resulting from a one-year, one-hour, storm (determined to be 0.6 inch per hour for the Los Angeles River watershed).

Monitoring Entity. The Monitoring Entity is the permittee or one of multiple permittees and/or co-permittees that has been authorized by all the other affected permittees or co-permittees to conduct baseline monitoring on their behalf.

Permittee. The term "permittee" refers to any permittee or co-permittee of a stormwater permit.

Trash. In this document, we are defining “trash” as man-made litter, as defined in California Government Code Section 68055.1(g):

> “Litter means all improperly discarded waste material, including, but not limited to, convenience food, beverage, and other product packages or containers constructed of steel, aluminum, glass, paper, plastic, and other natural and synthetic materials, thrown or deposited on the lands and waters of the state, but not including the properly discarded waste of the primary processing of agriculture, mining, logging, sawmilling or manufacturing [….]."

For purposes of this TMDL, we will consider trash to consist of litter and particles of litter that are retained by a 5-mm mesh screen. These particles of litter are referred to as “gross pollutants” in European and Australian scientific literature. This definition excludes sediments, and it also excludes oil and grease, and vegetation, except for yard waste that is illegally disposed of in the storm drain system. Additional TMDLs for sediments[1] and oil and grease may be required at a later date.

[1] Sediments which may be addressed in a separate TMDL are natural particulate matters such as silt and sand. Sediments result from erosion and are deposited at the bottom of a stream. Sediments do not refer to the decomposition of settleable litter into small particulate matters, which this TMDL is trying to prevent.

Urbanized Portion of the Watershed. For the purposes of this TMDL, the urban portion of the watershed includes the sum total area of the incorporated cities and the unincorporated portion of Los Angeles County which are located on the Los Angeles River watershed.[2] The estimated area of the "urbanized" portion of the watershed is 584 square miles[3]. The remainder of the watershed is made up of the Los Angeles National Forest and other open space.

III. Problem Statement

The problem statement consists of a description of the watershed, beneficial uses, water quality objectives, and a description of the impairment to the watershed caused by trash.

A. Description of the Watershed

The Los Angeles River flows 51 miles from the western end of the San Fernando Valley to the Queensway Bay and Pacific Ocean at Long Beach (see Figure A). The headwaters are at the confluence of Arroyo Calabasas and Bell Creek. Arroyo Calabasas drains Woodland Hills, Calabasas, and Hidden Hills in the Santa Monica Mountains. Bell Creek drains the Simi Hills and receives flows from Chatsworth Creek. From the confluence of Arroyo Calabasas and Bell Creek, the Los Angeles River flows east through the southern portion of the San Fernando Valley, bends around the Hollywood Hills before it turns south onto the broad coastal plain of the Los Angeles Basin, eventually discharging into Queensway Bay and thence into San Pedro Bay West of Long Beach Harbor. Together with its several major tributaries, notably the Tujunga Wash, Burbank Western Channel, Arroyo Seco, Rio Hondo, and Compton Creek, the Los Angeles River drains an area of about 834[4] square miles. Of this area, the incorporated cities and unincorporated portion of Los Angeles County comprise 584 square miles. The remaining acreage consists of the Los Angeles National Forest and other uses.

In the San Fernando Valley, the river flows east for approximately 16 miles along the base of the Santa Monica Mountains. Most of the Los Angeles River channel was lined with concrete between 1935 and 1959 for flood control purposes[5]. This reach is lined in concrete except for a section of the river with a soft bottom at the Sepulveda Flood Control Basin. The Sepulveda Basin is a 2,150-acre open space, located upstream of the Sepulveda Dam. It is designed to collect flood waters during major storms. Because the area is periodically inundated, it remains in natural or semi-natural conditions and supports a variety of low-intensity uses. The US Army Corps of Engineers owns the entire basin and leases most of the area to the City of Los Angeles Department of Recreation and Parks, which has developed a multi-use recreational area that includes a golf course, playing fields, hiking trails, and bicycle paths.

[2] The Regional Board recognizes that some areas within the unincorporated sections of Los Angeles County are actually suburban or rural.
[3] As determined by the Regional Board from GIS mapping. (Other minor differences in figures are due to rounding.)
[4] As determined by the Regional Board from GIS mapping.
[5] Gumprecht, Blake (1999) *The Los Angeles River: Its Life, Death, And Possible Rebirth*, p. 206.

The river is again lined in concrete for most of its course except for a seven-mile soft-bottomed segment between the confluence of the Burbank/Western Channel near Riverside Drive and north of the Arroyo Seco confluence. Three miles of this segment border Griffith Park (encompassing 4,217 acres). Four miles downstream, the river flows parallel to Elysian Park (585 acres in size). The original Pueblo de Los Angeles was founded just east of the river "to take advantage of the river's dependable supply of water."[6] Early this century, the progressive pumping of groundwater, together with major diversions of water for irrigation and other uses throughout the watershed, contributed to a decreased flow in the River. From Willow Street all the way through the estuary, the river is soft bottomed with areas of riparian vegetation. This unlined section is about three miles long. Also part of the watershed are a number of lakes including Peck Road Park Lake, Echo Park Lake, and Lincoln Park Lake.

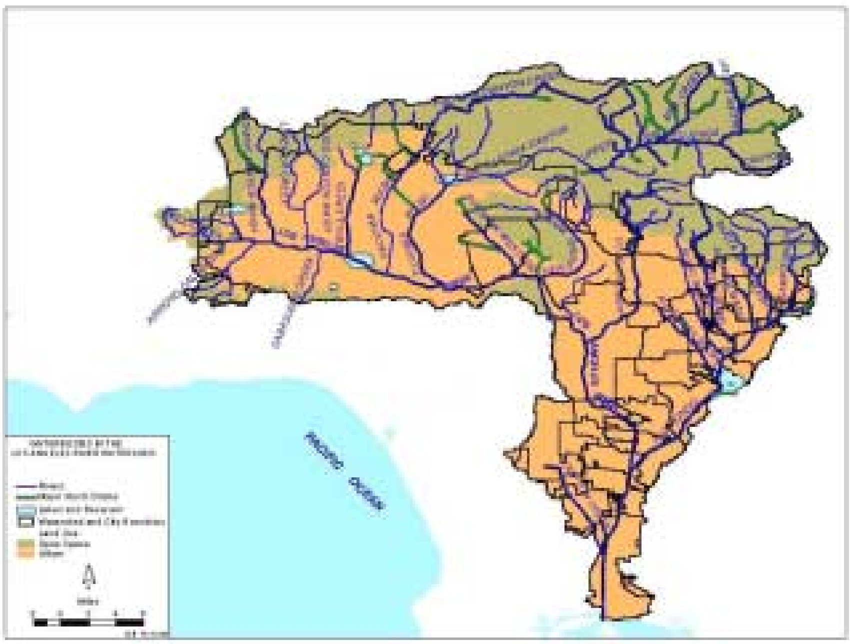

Figure A. Waterbodies in the Los Angeles River Watershed.

B. Beneficial Uses of the Watershed

A brief description of the beneficial uses most likely to be impaired due to trash in the Los Angeles River is provided in this section.

The upper reaches of the Los Angeles River include Sepulveda Basin, a soft-bottomed area that is designed as a flood control basin. Designated beneficial uses for the upper reaches are Municipal and Domestic Supply (MUN), Ground Water Recharge (GWR), Water Contact Recreation (REC1), Non-Contact Water Recreation (REC2), Warm Freshwater Habitat (WARM), Wildlife Habitat (WILD), and Wetland Habitat (WET). The arroyo chub is also found in the Sepulveda Basin area, and cannot survive on the flat surfaces on the concrete-lined portions of the Los Angeles River. The thick growth of riparian plants in this area provides habitat for a variety of wildlife. Native oaks grow along stretches of Valleyheart Drive in

[6] Los Angeles River Master Plan, June 1996, p. 211.

Studio City and Sherman Oaks. The river levees along this reach are accessible and neighborhood residents use them for walking and jogging.

Three native species of fish (the south coast minnow-sucker community) are found in Big Tujunga Creek from Big Tujunga Dam downstream to upper Hansen Dam. These are the Santa Ana sucker (Catastomus santaanae), which is listed as a federally endangered species, the Santa Ana speckled dace (Rhinichthys osculus) and the arroyo chub (Gila orcutti), both of which are State Species of Special Concern. They thrive in the moderate to fast cool or cold flows in gravelly and rocky riffles (suckers and dace), alternating with slower pools (chubs)[7].

Glendale Narrows, from Riverside Drive to Arroyo Seco (Figueroa Street), with the longest soft-bottomed segment (seven miles), supports many beneficial uses and is designated accordingly in the Basin Plan. This portion of the Los Angeles River is designated as open space in the various community general plans. Dense riparian vegetation provides habitat for wildlife including birds, ducks, frogs and turtles. Several small pocket parks are found along this section of the River, many of which were designed by North East Trees (NET), sometimes in partnership with the Mountains Recreation and Conservation Authority (MRCA), such as a small park South and North of Los Feliz Boulevard sometimes referred to as the "Los Angeles RiverWalk"[8] and Sunnynook park on the Atwater side, and Rattlesnake Park and Zanja Madre Park on the Silver Lake side. Another example of a pocket park, designed by MRCA, is Knox Park[9], at the end of Knox avenue. The riparian vegetation closely mimics the historical "willow sloughs" that once dotted the basin[10]. The relatively lush environment in this reach attracts people who enjoy many forms of recreation including walking, jogging, horseback riding, bicycling, bird watching, photography and crayfishing. There are several access points in this reach, including the pedestrian bridge over the Golden State Freeway from Griffith Park near Los Feliz Boulevard (Sunnynook Bridge). This whole section is lined with a maintained bike path, and many bicyclists use the path, which is cooled in places by the riparian trees. In addition, cut fences provide easy access for the many people who use this section of the river, including the homeless who have set up camp under some of the bridges within this reach or on the vacant land between Highway 5 and the fence to the river.

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[7] Camm Swift, Emeritus Natural History Museum of Los Angeles County, California Academy of Sciences, May 20, 2000.
[8] Nishith Dhandha, North East Trees, August 24, 2000.
[9] Ibid.
[10] Dan Cooper, Audubon Society, California Academy of Sciences, May 20, 2000.

Figure B. Fletcher Drive: Great Egret, October 26, 1999.

From Figueroa Street to Washington Boulevard, the river supports several beneficial uses, including the Downtown Channel, which is used by many for recreation and bathing, in particular by homeless people who seek shelter there.

The mid-cities reach (11½ miles from Washington Boulevard to Atlantic Avenue), has several beneficial uses. The western levee is available for trail use from Atlantic Boulevard in Vernon to Firestone Boulevard in South Gate. There is a county bike path on the eastern levee (the Lario Trail) and a county equestrian and hiking trail adjacent to the levee. Continuous access to the Lario Trail is provided below each street bridge crossing. Several parks have been developed adjacent to the river on the east side, some of which provide access to the river trail (Cudahy Park). In Vernon, the channel invert is used for lunchtime soccer games, and people walk or jog on the river maintenance roads mostly during the week at lunchtime. The utility easement in Bell is used partly for small, informal vegetable gardening.[11] South of the confluence of the Los Angeles River and the Rio Hondo Channel in South Gate, increasing numbers of birds can be seen using the channel and adjacent lands.[12]

The nine-mile reach from Atlantic Avenue to the ocean supports some of the most abundant bird life found on the Los Angeles River. The parks, spreading grounds, utility easements and vacant land adjacent to the river provide roosting and feeding habitat. Many species of birds also feed in the concrete channel, where algae grow in the warm, shallow water, and in the estuary South of Willow Street, including fish-eaters like waders (herons, egrets, occidental bitterns and rails), terns, osprey (a fish-eating hawk), pelicans and cormorants. California Brown Pelican and California Least Tern are Federally Endangered Species.[13]

[11] Los Angeles River Master Plan, p. 99.

[12] At the confluence there is a ten-acre site (approx.) owned by the City of South Gate which contains an abandoned landfill which is vegetated with grasses, shrubs and trees (Los Angeles River Master Plan).

[13] Dan Cooper, California Audubon Society, December 17, 1999.

The water in the estuary pools is deep and slow enough to support an abundant fish community as well. In addition to gobies and tilapia (mostly *Tilapia mozambica*)[14], which are very abundant in the Los Angeles River, especially South of Willow Street, many species of fish are found in the estuary of the Los Angeles River. As an example, the following species have been found between the Ocean boulevard bridge and Queensway Bay bridge: California tonguefish, California halibut, specklefin midshipman, California lizardfish, diamond turbot, barcheek pipefish, and Pacific staghorn sculpin (bottom feeders), as well as white croaker, queenfish, deepbody anchovy, white seaperch, slough anchovy, barred sand bass, shiner perch, California grunion, and striped mullet (midwater feeders, often associated with bottom environment). This area also has harbored some pelagic fish, some of which will venture up an undetermined portion of the estuary: northern anchovy, Pacific sardine, Pacific pompano, Pacific barracuda, topsmelt, jacksmelt, white seabass, barred pipefish, giant kelpfish, and bay pipefish.[15]

[14] Charles Mitchell, MBC Applied Environmental Sciences, December 19, 1999.
[15] Marine Biological Baseline Study of Queensway Bay, Long Beach Harbor, MBC Applied Environmental Sciences, 1994.

Beneficial uses of the Los Angeles River watershed are summarized in Table 1, excerpted from the 1994 Basin Plan. These are the designated beneficial uses that must be protected.[16]

Table 1. Beneficial Uses of Surface Waters of the Los Angeles River.

Surface Waters	Hydro Unit	MUN	IND	PROC	GWR	NAV	REC1	REC2	COMM	WARM	COLD	EST	MAR	WILD	RARE	MIGR	SPWN	SHELL	WET
Los Angeles River Estuary	405.12		E			E	E	E	E			E	E	E	E	E	E	P	E
Los Angeles River to Estuary	405.12	P	P	P	E		E	E		E			E	E	E	P	P	P	
Los Angeles River	405.15	P	P		E		E	E		E				P					
Los Angeles River	405.21	P	P		E		E	E		E				E					E
Compton Creek	405.15	P			E		E	E		E				E					E
Rio Hondo downstream Spreading Grounds	405.15	P			I		P	E		P				I					
Rio Hondo	405.41	P			I		I	E		P				I	E				E
Alhambra Wash	405.41	P			I		P	I		P				P	E				
Rubio Wash	405.41	P			I		I	I		I				E	P				
Rubio Canyon	405.31	P			E		I	I		I				E	E				E
Eaton Wash	405.41	P			I		I	I		I				E					
Eaton Wash (downstream dam)	405.31	P			I		I	I		I				E					
Eaton Wash (upstream dam)	405.31	P			I		I	I		I				E					
Eaton Dam and Reservoir	405.31	P			I		P	I		I				E					
Eaton Canyon Creek	405.31	P			E		E	E		E				E	E		E		E
Arcadia Wash (lower)	405.41	P			I		P	I		P				P					
Arcadia Wash (upper)	405.33	P			I		P	I		P				P					
Santa Anita Wash (lower)	405.41	P			I		P	E		P				P	E				
Santa Anita Wash (upper)	405.33	P			E		E	E		E				E	E				
Little Santa Anita Canyon Creek	405.33	P			I		I	I		I				E					
Big Santa Anita Reservoir	405.33	P			E		P	E		E	E			E					

[16] Water Quality Control Plan, Los Angeles Region, California Regional Water Quality Control Board, Los Angeles Region, 1994, p. 2-10.

Table 1. Beneficial Uses of Surface Waters of the Los Angeles River, continued.

Surface Waters	Hydro Unit	MUN	IND	PROC	GWR	NAV	REC1	REC2	COMM	WARM	COLD	EST	MAR	WILD	RARE	MIGR	SPWN	SHELL	WET
Santa Anita Canyon Creek	405.33	E			E		E	E		E	E			E	E		E		E
Winter Creek	405.33	P			I		I	E		I				E					E
East Fork Santa Anita Canyon	405.33	P			E		E	E		E	E			E			E		E
Sawpit Wash	405.41	I			I		I	I		I				E					
Sawpit Canyon Creek	405.41	P			I		I	I		I				E	E				
Sawpit Dam and Reservoir	405.41	P			I		P	I		I				E					
Monrovia Canyon Creek	405.41	I			I		I	I		I				E					E
Arroyo Seco downstream Devil's Gate R. (L)	405.15	P					I	I		P				P					
Arroyo Seco downstream Devil's Gate R. (U)	405.31	P					I	I		P				P	E				
Devil's Gate Reservoir (L)	405.31	P			I		I	I		I				E					
Devil's Gate Reservoir (U)	405.32	I			I		I	I		I				E					
Arroyo Seco upstream Devil's Gate R.	405.32	E	E	E	E		E	E		E	E			E					E
Millard Canyon Creek	405.32	E	E	E	E		E	E		E				E	E				E
El Prieto Canyon Creek	405.32	I	I	I	I		I	I		I				E					
Little Bear Canyon Creek	405.32	P			I		I	I		I	I			E					E
Verdugo Wash	405.24	P			I		P	I		P				P					
Halls Canyon Channel	405.24	P	I	I	I		I	I		I				E					
Snover Canyon	405.32	I	I	I	I		I	I		I				E					
Pickens Canyon	405.24	I			I		I	I		I				E					
Shields Canyon	405.24	I	I	I	I		I	I		I				E					
Dunsmore Canyon Creek	405.24	I	I	I	I		I	I		I				E					

Table 1. Beneficial Uses of Surface Waters of the Los Angeles River, continued.

Surface Waters	Hydro Unit	MUN	IND	PROC	GWR	NAV	REC1	REC2	COMM	WARM	COLD	EST	MAR	WILD	RARE	MIGR	SPWN	SHELL	WET
Burbank Western Channel	405.21	P					P	I		P				P					
La Tuna Canyon Creek	405.21	P			I		I	I		I				E					
Tujunga Wash	405.21	P			I		P	I		P	P			P					
Hansen Flood Control Basin & Lakes	405.23	P			E		E	E		E	E			E	E				
Lopez Canyon Creek	405.21	P			I		I	I		I				E					
Little Tujunga Canyon Creek	405.23	P			I		I	E		I	I			E	E				
Kagel Canyon Creek	405.23	P			I		I	I		I				E					
Big Tujunga Canyon Creek	405.23	P			E		E	E		E	E			E	E		E		E
Upper Big Tujunga Canyon Creek	405.23	P			E		E	E		I	P			E					E
Haines Canyon Creek	405.23	P			I		I	I		I				E	E				
Vasquez Creek	405.23	P			E		E	E		P	P			E					E
Clear Creek	405.23	P			E		E	E		E	E			E					E
Big Tujunga Reservoir	405.23	P			E		P	E		E	P			E			E		
Mill Creek	405.23	P			E		E	E		E	E			E					E
Pacoima Wash	405.21	P			E		P	E		E				E	E				
Pacoima Reservoir	405.22	P			E		E	E		E				E					
Pacoima Canyon Creek	405.22	P			E		E	E		E	E			E	E		E		E
Stetson Canyon Creek	405.22	P			I		P	E		P				P					
Wilson Canyon Creek	405.22	P			I		E	E		I				E					
May Canyon Creek	405.22	P			I		I	E		I				E					
Sepulveda Flood Control Basin	405.21	P			E		E	E		E				E					E
Bull Creek	405.21	P			I		I	I		I				E					
Los Angeles Reservoir	405.21	E	E	E	P		P	E		E				E	E				
Lower Van Norman Reservoir	405.21	E	E	E	E		E	E		E				E	E				
Solano Reservoir	405.21	E					P			P				E					
Caballero Creek	405.21	P			I		I	I		I				E					
Aliso Canyon Wash and Creek	405.21	P			I		I	I		I				E					
Limeklin Canyon Wash	405.21	P			I		I	I		I				E					

Table 1. Beneficial Uses of Surface Waters of the Los Angeles River, concluded.

Surface Waters	Hydro Unit	MUN	IND	PROC	GWR	NAV	REC1	REC2	COMM	WARM	COLD	EST	MAR	WILD	RARE	MIGR	SPWN	SHELL	WET
Browns Canyon Wash and Creek	405.21	P			I		I	I		I				E					
Arroyo Calabasas	405.21	P					P	I		P				P					
McCoy Canyon Creek	405.21	P			I		I	I		I				E					
Dry Canyon Creek	405.21	P			I		I	I		I				E					
Bell Creek	405.21	P			I		I	I		I				E					
Chatsworth Reservoir	405.21	E	E	E			P	E		E				E					
Dayton Canyon Creek	405.21	P			I		I	I		I				E					
Echo Lake	405.15	P					P	E		P				E					
Lincoln Park Lake	405.15	P					P	E		P				E					

E: Existing beneficial use
P: Potential beneficial use
I: Intermittent beneficial use

BENEFICIAL USE CODES (see Basin Plan for more details):

MUN - Municipal and Domestic Water Supply
IND - Industrial Service Supply
PROC - Industrial Process Supply
GWR - Ground Water Recharge
REC1 - Water Contact Recreation
REC2 - Non-Contact Water Recreation
COMM - Commercial and Sport Fishing

WARM - Warm Freshwater Habitat
COLD - Cold Freshwater Habitat
EST - Estuarine Habitat
MAR - Marine Habitat
WILD - Wildlife Habitat
RARE - Rare, Threatened or Endangered Species
SPWN - Spawning, Reproduction, and/or Early Development
SHELL - Shellfish Harvesting
WET - Wetland Habitat

C. Water Quality Objectives

Water quality standards consist of a combination of beneficial uses, water quality objectives and the State's Antidegradation Policy. The narrative water quality objectives applicable to this TMDL are **floating materials***: "Waters shall not contain floating materials, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses*"[17] and **solid, suspended, or settleable materials:** "*Waters shall not contain suspended or settleable material in concentrations that cause nuisance or adversely affect beneficial uses*."[18] The States' Antidegradation Policy is formally referred to as the *Statement of Policy with Respect to Maintaining High Quality Waters in California* (State Board Resolution No. 68-16).

D. Impairment of Beneficial Uses

Existing beneficial uses impaired by trash in the Los Angeles River are contact recreation (REC 1) (contact sports: swimmers are spotted regularly in the Los Angeles River at Glendale Narrows and also at Willow Street in Long Beach) and non-contact recreation such as fishing (REC 2) (trash is aesthetically displeasing and deters recreational use and tourism); warm fresh water habitat (WARM); wildlife habitat (WILD); estuarine habitat (EST) and marine habitat (MAR); rare, threatened or endangered species (RARE); migration of aquatic organisms (MIGR) and spawning, reproduction and early development of fish (SPWN); Commercial and sport fishing (COMM); [19]Wetland Habitat (WET), and Cold freshwater habitat (COLD). These beneficial uses in the Los Angeles River are impaired by large accumulations of suspended and settled debris throughout the river system. The problem is even more acute in Long Beach where debris flushed down from the upper reaches of the river collects. Common items that have been observed by Regional Board staff include Styrofoam cups, Styrofoam food containers, glass and plastic bottles, toys, balls, motor oil containers, antifreeze containers, construction materials, plastic bags, and cans. Heavier debris can be transported during storms as well.

Reaches of the Los Angeles River that are impaired by trash, and listed on the 303(d) list for such, are Tujunga Wash (downstream Hansen Dam to Los Angeles River), Los Angeles River Reach 5 (within Sepulveda Basin), Los Angeles River Reach 4 (Sepulveda Dam to Riverside Dr.), Los Angeles River Reach 3 (Riverside Dr. to Figueroa St.), Los Angeles River Reach 2 (Figueroa St. to upstream Carson St.), Los Angeles River Reach 1 (upstream Carson St. to estuary), Burbank Western Channel, Verdugo Wash (Reaches 1 & 2), Arroyo Seco Reach 1 (downstream Devil's Gate Dam) & Reach 2 (W. Holly Ave. to Devil's Gate), and Rio Hondo Reach 1 (Santa Ana Fwy to Los Angeles River). In addition, Peck Road Lake, Echo Park Lake and Lincoln Park Lake are listed as impaired for trash.

Trash in waterways causes significant water quality problems. Small and large floatables can inhibit the growth of aquatic vegetation, decreasing spawning areas and habitats for fish and other living organisms. Wildlife living in rivers and in riparian areas can be harmed by ingesting or becoming entangled in floating trash. Except for large items such as

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[17] Water Quality Control Plan ("Basin Plan"), p. 3-9.
[18] Ibid., pp. 3-16.
[19] Why did we delete this use? Shellfish harvesting is designated as potential for the estuary, and the estuary is listed for Trash. (MZ)

shopping carts, settleables are not always obvious to the eye. They include glass, cigarette butts, rubber, construction debris and more. Settleables can be a problem for bottom feeders and can contribute to sediment contamination. Some debris e.g. (diapers, medical and household waste, and chemicals) are a source of bacteria and toxic substances. Floating debris that is not trapped and removed will eventually end up on the beaches or in the open ocean, repelling visitors away from our beaches and degrading coastal waters.

A major trash problem experienced in the Los Angeles River Watershed contributes to a broader phenomena that affects ocean waters, as small pieces of plastic called "nurdles" (defined as pre-production virgin material from plastic parts manufacturers, as well as post-production discards that are occasionally recycled) float at various depths in the ocean and affect organisms at all levels of the food chain. As sunlight and UV radiation render plastic brittle, wave energy pulverizes the brittle material, with a subsequent chain of nefarious effects on the various filter feeding organisms found near the ocean's surface. Studies in the North Pacific indicate that both large floating plastic and smaller fragments are increasing. As a result of increased reports of resin pellet ingestion by aquatic wildlife and evidence that the ingested pellets are harming wildlife, the Interagency Task Force on Persistent Marine Debris (ITF) identified resin pellets, also know as plastic pellets, as a debris of special concern.[20] When released into the environment, these pellets either may float on or near the water surface, may become suspended at mid-depths, or may sink to the bottom of a water body. Whether a specific pellet floats or sinks depends on the type of polymer used to create the pellet, on additives used to modify the characteristics of the resin, and on the density of the receiving water.

A 1999 study of Marine Debris in the Mid-Pacific Gyre in an attempt to assess the potential effects of ocean particles on filter feeding marine organisms, collected plankton samples at various locations throughout the gyre. The results were stunning: the mass of plastic particles collected was six times higher than the mass of plankton (841 g/km^2), although the number of planktonic organisms (1,837,342/km^2) was five times the number of plastic pieces. The distribution of the sampling points allows one to assume that these number can be safely extrapolated to the breadth of the Mid-Pacific Gyre. A remarkable finding was that the number of particles did not increase in successively smaller size classes as expected, indicating there may be non-selective removal by mucus web-feeding jellies and salp. In this study, the most common type of identifiable particle, thin plastic film, accounted for 29% of the total. Many birds will die from ingesting this non-nutritive plastic.[21]

The prevention and removal of trash in the Los Angeles River ultimately will lead to improved water quality and protection of aquatic life and habitat, expansion of opportunities for public recreational access, enhancement of public interest in the rivers and public participation in restoration activities, and propagation of the vision of the river as a whole and enhancement of the quality of life of riparian residents.

[20] US Environmental Protection Agency (US EPA) (1992) **Plastic Pellets in the Aquatic Environment: Sources and Recommendations.**

[21] Moore, C.J. et al. **Marine Debris in the North Pacific Gyre, 1999, with a Biomass Comparison of Neustonic Plastic and Plankton**. (in preparation)

E. Extent of the Trash Problem in the Los Angeles River

Trash is a water quality problem throughout the Los Angeles River. The Regional Board has determined that current levels of trash exceed the existing Water Quality Objectives necessary to protect the beneficial uses of the river.

For many years, Los Angeles County and other cities have recognized that trash is a problem.[22] The Los Angeles County Department of Public Works is reporting a "30% decrease in roadway trash on unincorporated County roads and a 50% decrease in trash entering catchbasins since adoption of the current National Pollutant Discharge Elimination System (NPDES) Permit".[23] However, trash in the Los Angeles River continues to be a serious problem.

Every city in the watershed agrees that the amount of trash found in the waterways is excessive, and that trash is found in all reaches of the river from Calabasas to Long Beach, and in all tributaries. Although the Regional Board has not yet received the data that the Los Angeles County Department of Public Works used for its findings, Regional Board staff regularly observe trash in the waterways of this watershed. Non-profit organizations such as Heal the Bay, Friends of the Los Angeles River (FoLAR) and others, organize volunteer clean-ups periodically, and document the amount of trash that was removed on such days, but these data do not indicate how long the trash had been accumulating at that particular site, only the amount that was picked up by the volunteers on a given day.

For example, at Coastal Clean-up Day in 1996, 26,300 lbs of trash were collected in Los Angeles County. During the September 18, 1999, California Coastal Clean up organized by Heal the Bay, a total of 60,711 lbs of trash were collected.[24]

At a clean-up organized during the Sacred Music Festival on Saturday, October 16, 1999, between Los Feliz Boulevard and Fletcher Drive over a distance of slightly under 1.5 miles, eleven shopping carts and six 40-gallon bags of trash were removed (see Figure C). However, this was not the total amount of trash on site, as Regional Board staff noticed more shopping carts and more trash on the same site the very next afternoon.[25] Meanwhile, the purpose of volunteer clean-ups is to visibly clean the river and its banks, not to quantify debris. As a result, it is likely that some of the debris collected during those events are not recorded. In addition, volunteers traditionally focus on larger, more visible debris to the exclusion of smaller debris which are commonly encountered, such as cigarette butts.

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[22]See comments from Los Angeles County, Agoura Hills, Artesia, Beverly Hills, Hermosa Beach, Hidden Hills, Carson, Diamond Bar, La Habra Heights, La Mirada, La Puente, Monrovia, Norwalk, Rancho Palos Verdes, Rolling Hills, San Fernando, San Marino, West Hollywood, Westlake Village, and the Executive Advisory Committee (Stormwater Program - Los Angeles County) on behalf of all the Los Angeles County cities, submitted in response to the first draft of this Trash TMDL for the Los Angeles River Watershed.

[23]Comment letter from County of Los Angeles, Department of Public Works, May 15, 2000, p. 1.

[24] Alix Gerosa, Heal the Bay, November 22, 1999.

[25] Trash observed by Regional Board staff on October 17, 1999, included mixed polystyrene waste (cups, plates and others), plastic bags, cement, sound boards, large clutters of cigarette butts, disposable plastic glass lids, aluminum wrappers, balloons, medications, plastic bottles, clothing, books, and aerosol paint cans.

Figure C. Trash waiting for pick-up at Los Feliz Boulevard after the Sunday, October 16, 1999 river clean-up.

Several studies which attempted to quantify trash generated from discreet areas have been completed, but they concern relatively small areas, or relatively short periods, or both. The findings of some of these studies are discussed below.

The City of Calabasas cleaned out the Continuous Deflective Separation (CDS) Unit they had installed in December of 1998, on September 28, 1999. This CDS unit, located in Calabasas at the intersection of Las Virgenes Road and Agoura Road, collects trash from the runoff of a small storm drain, as well as part of the runoff from Calabasas Park Hills (Santa Monica Mountains), and eventually empties to Las Virgenes Creek. It is assumed that this CDS unit prevented all trash from passing through. The calculated area drained by this CDS Unit, as provided to the Regional Board by Los Angeles County Department of Public Works staff, amounts to 12.8 square miles. The urbanized area was estimated by Regional Board staff to amount to 0.10 square miles of the total area. The result of this clean-out, which represents approximately half of the 1998-1999 rainy season, was 2,000 gallons of sludgy water and a 64-gallon bag about two-third full of plastic food wrappers. It is assumed that part of the trash that accumulated in the CDS unit over roughly half of the rainy season had decomposed in the unit, hence the absence of paper products. Given the CDS unit was cleaned out after slightly more than nine months of use, it was assumed that this 0.10 square mile urbanized area produced a volume of 64 gallons of trash over one year. This datum will be used as the default value for the implementation plan. Although other studies are informative, studies currently available to the Regional Board provide insufficient data and could not be applied directly to establishing trash generation rates.

The City of Los Angeles conducted an Enhanced Catch Basin Cleaning Pilot Project in compliance with a consent decree between the United States Environmental Protection Agency, the State of California, and the City of Los Angeles. The project goals were to determine debris loading rates, characterize the debris, and find an optimal cleaning schedule through enhancing catch basin cleaning. The project evaluated trash loading at two drainage basins:

-The Hollywood Basin (1,366 acres and 793 catch basins) includes much of Hancock Park and is mostly residential with some commercial and open space, and no industrial land;

-The Sawtelle Basin (2,267 acres and 502 catch basins) includes residential areas with some commercial, industrial and transportation-related uses, and some open space.

The catch basins are inlet structures without a sump below the level of the outlet pipe to capture solids and trash washed down by the stormwater.[26] These inlets also collect trash, grass clippings and animal wastes during dry weather. Catch basins were cleaned 3-4 times from March 1992 to December 1994 and yielded approximately 0.79 yd^3 (160 Gal) of debris per cleaning (Sawtelle – 1.04 yd^3 (210 Gal) and Hollywood – 0.61 yd^3 (123 Gal)), characterized as paper (26%), plastic wastes (10%), soil (33%), and yard trimmings (31%).

The study also observed that the amount of plastic waste was less in residential areas and greater in non-residential areas, that paper waste was greater in commercial areas, and that soil and yard waste was greater in residential areas and open spaces.[27]

Long Beach collects large amounts of trash at the mouth of the Los Angeles River, as much of the trash carried down the Los Angeles River ends up at the river's mouth in Long Beach. Debris tonnage at the mouth of the Los Angeles River is listed in Table 2.

Table 2. Storm Debris Collection Summary for Long Beach: Debris is measured in Tonnage.[28]

	First Quarter (July-Sept.)	Second Quarter (Oct.-Dec.)	Third Quarter (Jan.-March)	Fourth Quarter (April-June)	Total
1995-96	73[29]	344	3,100	645	4,162
1996-97	350	2,361	601	681	3,993
1997-98	647	3,650	4,016	977	9,290
1998-99	565	720	532	1,274	3,091

IV. Numeric Target

The numeric target is 0 (zero) trash in the water. The numeric target is staff's interpretation of the narrative water quality objective, including an implicit margin of safety. Although a substantial number of comments were received in response to the March 17, 2000 Draft TMDL, no information was provided to justify any other number that would fully support the designated beneficial uses. The numeric target was used to calculate the Waste Load Allocations as described in the Implementation Plan (see Section VIII.)

[26] Such structures are usually termed *catchments*, but the term *catch basin* is used throughout Southern California. The absence of flow during dry weather allows trash to collect at the inlet. (Phone conversation with Wing Tam, City of Los Angeles, November 10, 1999.)

[27] This information and all of the above concerning the City of Los Angeles Enhanced Catch Basin Cleaning was found in: City of Los Angeles Department of Public Works, Bureau of Sanitation: Consent Decree Report, Enhanced Catch Basin Cleaning, April 1999. (Unpublished report.)

[28] City of Long Beach Memorandum from Geoffrey Hall, Parks, Recreation and Marine, to Ed Putz, City Engineer.

[29] 9/95 only.

V. Source Analysis

The major source of trash in the river results from litter, which is intentionally or accidentally discarded in watershed drainage areas. Transport mechanisms include the following:

1. Storm drains: trash is deposited throughout the watershed and is carried to the various reaches of the river and its tributaries during and after significant rainstorms through storm drains.

2. Wind action: trash can also blow into the waterways directly.

3. Direct disposal: direct dumping also occurs.

Extensive research has not been done on trash generation or the precise relationship between rainfall and its deposition in waterways. However, it has been found that the amount of gross pollutants entering the stormwater system is rainfall dependent but does not necessarily depend on the source (Walker and Wong, December 1999). The amount of trash which enters the stormwater system depends on the energy available to re-mobilize and transport deposited gross pollutants on street surfaces rather than on the amount of available gross pollutants deposited on street surfaces. The exception to this finding of course would be in the event that there is zero gross pollutants deposited on the street surfaces or other drainages tributary to the storm drain. Where gross pollutants exist, a clear relationship between the gross pollutant load in the stormwater system and the magnitude of the storm event has been established. The limiting mechanism affecting the transport of gross pollutants, in the majority of cases, appears to be re-mobilization and transport processes (i.e., stormwater rates and velocities).

Several studies conclude that urban runoff is the dominant source of trash. The large amounts of trash conveyed by urban storm water to the Los Angeles River is evidenced by the amount of as trash that accumulates at the base of storm drains. The amount and type of trash that is washed into the storm drain system appears to be a function of the surrounding land use.

A number of studies (Walker and Wong, 1999, Allison, 1995), have shown that commercial land-use catchments generate more pollutants than residential land use catchments, and as much as three times the amount generated from light industrial land use catchment. It is generally accepted that commercial land uses tend to contribute larger loads of gross pollutants per area compared to residential and mixed land-use areas. This is in spite of daily street sweeping in the commercial sub-catchment compared to once every two weeks in residential and mixed land use areas.

VI. Waste Load Allocations

Storm drains have been identified as a major source of trash in the Los Angeles River. The strategy for meeting the water quality objective will focus on reducing the trash discharged via municipal storm drains.

Waste Load Allocations will be assigned to the Permittees and Co-permittees of the Los Angeles County Municipal Stormwater Permit (hereinafter referred to as Permittees) and Caltrans. In addition, Waste Load Allocations may be issued to additional facilities in the future under Phase II of the US EPA Stormwater Permitting Program. Waste Load Allocations assigned under the MS4 permit and the Caltrans permit will be based on a phased reduction from the estimated current discharge (i.e., baseline) over a 10-year period until the final Waste Load Allocation (currently set at zero) is met. The baseline allocation for the MS4 Permittees and Co-permittees (referred to hereinafter as the "Permittees") will be derived from currently available data (i.e., default baseline allocations) or refined data collected during the Baseline Monitoring Program.

Upon completion of the baseline monitoring, staff shall report to the Board the results of such baseline monitoring. The Regional Board will review the final Waste Load Allocations once a reduction of 50% has been achieved. This means that the final Waste Load Allocation will be reviewed only after substantial reductions are achieved. A review of the Waste Load Allocation will be based on the findings of future studies regarding the threshold levels needed for protecting beneficial uses. The threshold level is presumed to be specific to all categories of trash.

A. Default Baseline Waste Load Allocation

The Default Baseline Waste Load Allocation for the municipal stormwater permittees is equal to 640 gallons of uncompressed trash per square mile per year. No differentiation will be applied for different land uses in the Default Baseline Waste Load Allocation. This value is based on data provided by the City of Calabasas, as described previously. In the event that the permittees elect to rely on the Default Baseline Waste Load Allocation, they must first establish a conversion factor translating uncompressed volume to a standardized compacted volume and/or dry weight. The final Default Baseline Waste Load Allocation, as described in compressed volume and/or dry weight, will be specified in the stormwater permit.

B. Refined Baseline Waste Load Allocations

The municipal stormwater permittees may opt to seek refinement of the Default Baseline Waste Load Allocation by implementing an approved "Baseline Monitoring Plan," as described in Section VII. The goal of the Baseline Monitoring program is to derive a representative trash generation rate for various land uses from across the Los Angeles River watershed. The Baseline Waste Load Allocation for any single city will be the sum of the products of each land use area multiplied by the Waste Load Allocation for the land use area, as shown below:

$$LA = \sum \textit{for each city} \left(\textit{area by land uses} \bullet \textit{allocations for this land use} \right)$$

The urban portion of the Los Angeles River watershed was divided into twelve types of land uses for every city and unincorporated area in the watershed. Similar land use classifications already exist on the land use maps used by L.A. County Department of Public

Works to assess the generation of certain pollutants by land use.[30] The land use categories are: (1) high density residential[31], (2) low density residential[32], (3) commercial and services, (4) industrial, (5) public facilities[33], (6) educational institutions[34], (7) military installations, (8) transportation[35], (9) mixed urban[36], (10) open space and recreation[37], (11) agriculture[38], and (12) water[39]. Given that the minimum mapping resolution is 2.5 acres, a non-critical land use unit may not be mapped if it is less than 2.5 acres in size[40].

The appendix contains a table which shows the square mileage for each land use for each city and unincorporated areas in the watershed, and a list of maps showing land uses for each city. Unincorporated areas include areas such as Altadena, East Compton, East Los Angeles, East Pasadena, East San Gabriel, Florence, La Crescenta, Mayflower Village, North El Monte, South San Gabriel, Walnut Park, Westmount and Willowbrook. For cities that are only partially located on the watershed, the square mileage indicated is for the part of this city that is in the watershed only.

Land uses that are not under municipal jurisdiction, such as military installations, will be dealt with through separate permits, and will thus be monitored separately.

Each permittee will be allowed 90% of their baseline Waste Load Allocation during the first year of implementation, and the allocation will be reduced from the baseline by an average 10% through every year of implementation.

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30 The land use classification was developed by Aerial Information Systems as a modified Anderson Land Use Classification and originally included 104 categories. The land use coverages were donated for GIS library use by Southern California Association of Governments (SCAG), and show land use for 1990 and for 1993. The coverages were mapjoined into a single coverage by Teale Data Center. The Regional Board layers were aggregated from the TDC coverage into the land uses shown above.

31 High Density Residential includes High Density Single Family Residential and all Multi Family Residential, Mobile Homes, Trailer Parks and Rural Residential High Density.

32 Under 2 units per acre.

33 These include government centers, police and sheriff stations, fire stations, medical health care facilities, religious facilities large enough to be distinguished on an aerial photograph, libraries, museums, community centers, public auditoriums, observatories, live indoor and outdoor theaters, convention centers which were built prior to 1990, communication facilities, and utility facilities (electrical, solid waste, liquid waste, water storage and water transfer, natural gas and petroleum).

34 Preschools and daycare centers, elementary schools, high schools, colleges and universities, and trade schools, including police academies and fire fighting training schools.

35 Airports, railroads, freeways and major roads (that meet the minimum mapping resolution of 2.5 acres), park and ride lots, bus terminals and yards, truck terminals, harbor facilities, mixed transportation and mixed transportation and utility.

36 Mixed commercial, industrial and/or residential, and areas under construction or vacant in 1990.

37 Golf courses, local and regional parks and recreation, cemeteries, wildlife preserves and sanctuaries, botanical gardens, beach parks.

38 Orchards and vineyards, nurseries, animal intensive operations, horse ranches.

39 Open water bodies, open reservoirs larger than 5 acres, golf course ponds, lakes, estuaries, channels, detention ponds, percolation basins, flood control and debris dams.

40 Critical land uses were mapped regardless of resolution limits. Critical land use units below 1 acre in size were mapped as 1-acre units.

C. Baseline Waste Load Allocations for Caltrans

A Litter Management Pilot Study (LMPS)[41] was conducted to evaluate the effectiveness of several litter management practices in reducing litter that is discharged from Caltrans storm water conveyance systems. The LMPS employed four field study sites, each of which was used to test a separate BMP. Each site included three replicate testing pairs, consisting of one site designed to measure the amount of trash produced when treatment was applied, and one control with no treatment site. The LMPS averages the data collected at the control outfalls in order to obtain the annual litter loads. The average combined total loads for the three control outfalls at each site normalized by the total area of control catchments is presented in the following table, adapted from the LMPS report[42]:

Table 3. Average Combined Total Loads for Control Outfalls at 3 Litter Management Pilot Study (LMPS) Sites.

Site	Weight lbs/sq mi	Volume cu ft/sq mi
1E	10584.00	1312.97
1W	7479.36	971.73
6	7479.36	881.34
8	4374.72	404.51

A preliminary baseline Waste Load Allocation for weight and volume load generation for freeways is arrived at by averaging weight and volume columns. (see Table 4.)

Table 4. A Preliminary Baseline Waste Load Allocation for Weight and Volume for Freeways.

Weight lbs/sq mi	Volume cu ft/sq mi
7479.36	892.64

This is a default allocation which can be refined through baseline monitoring following the protocol previously indicated for baseline monitoring. It is to be noted that control site 1E already had one BMP in place before testing of the other BMPs, as it was cleaned monthly through an "Adopt a Highway" program.

Average Annual Daily Traffic (AADT) for all control sites in the study ranged from 216,000 to 238,000.[43] Considering AADT on Los Angeles County freeways may be close to 300,000 on some sections[44], the chosen sites, although typical freeway outfalls, are not distributed throughout the whole AADT range. As the purpose of the study was to assess the effectiveness of specific BMPs, not to assess a trash generation factor, sites were chosen with similar characteristics.

[41] California Department of Transportation District 7 Litter Management Pilot Study, June 2000. This study defined litter in stormwater as "manufactured items that can be retained by ¼-inch mesh made from paper, plastic, cardboard, etc.", and "that are not of natural origin (i.e. does not include sand, soil, gravel, vegetation, etc.)" (p. 1-2).
[42] Ibid., Table 6-8.
[43] Ibid., Table 6-8.
[44] Information on AADT on select freeways can be found on Caltrans' website: http://www.caltrans.ca.gov/.

D. Baseline Waste Load Allocations for Municipal Permittees

Watershed wide default allocations for the ten-year implementation period are presented in Table 5. The default annual baseline Waste Load Allocation for the municipal permittees is 49,124.6 cubic feet (expressed as uncompressed volume) and 7,944 cubic feet for Caltrans.[45] The Waste Load Allocations represent a progressive reduction in the baseline Waste Load Allocation over a period of 10 years. The volumes shown, in cubic feet, are in uncompressed volumes, but in the event that the permittees elect to rely on the default baseline Waste Load Allocations, this unit of measure will be converted to an equivalent unit expressed in cubic yards based on a standardized compaction rate or dry weight.

Table 5. Default Waste Load Allocations. (Expressed as cubic feet of uncompressed trash and % reduction.)[46]

Year of Implementation[47]	Municipal Stormwater Default Waste Load Allocation
Year One	44,212.1 or 90% of the baseline load
Year Two	39,299.7 or 80% of the baseline load
Year Three	34,387.2 or 70% of the baseline load
Year Four	29,474.8 or 60% of the baseline load
Year Five	24,562.3 or 50% of the baseline load
Year Six	19,649.8 or 40% of the baseline load
Year Seven[48]	14737.4 or 30% of the baseline load
Year Eight	9,824.9 or 20% of the baseline load
Year Nine	7 4,912.5 or 10% of the baseline load
Year Ten	0 or 0% of the baseline load

VII. Baseline Monitoring

The goal of the Baseline Monitoring Program is to collect representative data from across the watershed that can be used to refine the default Waste Load Allocations. Two Baseline Monitoring Strategies are outlined herein. The first is the program presented in the March 17, 2000, draft document. The second is an Alternative Baseline Monitoring Program based on a plan presented by the Los Angeles County, Department of Public Works, in a

[45] Based on a default baseline load allocation of 86 cubic feet per square mile for the municipal permittees and 893 cubic feet per square mile for Caltrans.

[46] Table has been simplified to show default watershed wide allocations for permittees only.

[47] Year of implementation subsequent to the two-year baseline monitoring program.

[48] A review of the current target will be allowed once a reduction of 50% has been achieved and sustained.

letter dated August 30, 2000. Baseline monitoring will be required via Section 13267 of the Porter-Cologne Water Quality Control Act (hereinafter referred to as "Porter-Cologne").

A number of permittees objected to the Baseline Monitoring Plan as presented in the March 17, 2000, Draft TMDL. Most of the objections were based on the cost of employing full-capture monitoring systems across 10% of the watershed. In addition, finding a watershed that drains a single land use also was problematic. In an effort to arrive at a less costly plan that would still provide representative data sufficient for use in deriving Baseline Waste Load Allocations, the Los Angeles County Department of Public Works convened a committee of the municipal permittees to evaluate alternative strategies. Regional Board staff met with the committee on nine occasions to establish the minimum requirements for an Alternative Baseline Monitoring Plan and to review various strategies. The minimum requirements established were:

- The plan would provide representative data from across the watershed.
- The plan would provide data in units that were easily reproduceable and would be comparable with data to be collected during the Implementation Phase (i.e., we would be comparing apples with apples).
- The permittees agreed that Baseline Waste Load Allocations would be derived from data generated from the plan.

One issue of concern was whether representative data could be collected if rainfall was below normal during the Baseline Monitoring period. Staff has addressed this concern by specifying that the Permittees may elect to continue the Baseline Monitoring for an additional two years. However, the Implementation Schedule will not be delayed as a result of the extended Baseline Monitoring.

A. Land Use Areas to be Monitored

Monitoring data will be used to establish specific trash generation rates per land use. Thus, all monitoring will be designed according to land use. Some of the land uses will be monitored by the Los Angeles County Department of Public Works (LACDPW), possibly in association with the cities located on the Los Angeles River watershed, while other land uses which are outside the jurisdiction of the municipalities, such as airports, will be monitored using similar methods by the appropriate permittees, and the resulting baseline monitoring results will then be applied as these entities are permitted under EPA Phase II Storm Water regulations. City and County streets are included in each land use as they are monitored.

The land use categories that will be monitored by the LACDPW baseline monitoring group (in order to determine land use based generation rates) are:

- High density residential,
- Low density residential,
- Commercial and services,
- Industrial, and
- Open space and recreation.

Certain land uses will be exempt from monitoring:

- public facilities,
- mixed urban,
- agriculture, and
- water.

Public facilities (except educational institutions) will not be monitored because their diversity makes it difficult to obtain a representative generation rate. Thus, their generation rate will be assumed to be the highest between residential, commercial and industrial.

Mixed urban will not be monitored, instead the generation rate for mixed urban will again be assumed to be the highest between residential, commercial and industrial.

Agricultural land uses will be exempt from monitoring because they represent such a small percentage of the total watershed. The assigned generation rate will be that of the geographically closest land use.

Water will be exempt from monitoring because it is not considered a generator of trash.

Transportation land use, as defined by the Regional Board, includes airports, railroads, freeways and major roads (that meet the minimum mapping resolution of 2.5 acres), park and ride lots, bus terminals and yards, truck terminals, harbor facilities, mixed transportation and mixed transportation and utilities. Of that land use, what is under Caltrans' jurisdiction will be covered under Caltrans' permit. Caltrans will be required to submit a monitoring plan for that land use, and will be assigned a Waste Load Allocation as well. Major boulevards that are currently under Caltrans' jurisdiction, but are affected by trash generated on municipal sites, such as Santa Monica Boulevard, will be addressed by the cities concerned. Baseline monitoring for airports will be done separately and airports will be permitted separately, so the Regional Board will require that the Burbank-Glendale-Pasadena airport submit a separate monitoring program.

Under EPA Phase II of the Storm Water Regulations, separate permits will be written for state and federal facilities. Thus, public educational institutions and military installations will be covered under separate permits under Phase II. Again, these entities covered under separate permits will have to conduct baseline monitoring as well in order to arrive at a trash generation factor. Private education facilities, however, are under cities' jurisdiction and are part of the city. Thus, private educational institutions will be assigned the rate of the geographically closest land use.

Each of the permittees and co-permittees are responsible for monitoring land uses within their jurisdiction. However, monitoring responsibilities may be delegated to a third-party monitoring entity such as LACDPW, or other permittees or co-permittees as appropriate.

B. General Baseline Monitoring Plan Requirements

The following general requirements will apply during Baseline Monitoring, regardless of the monitoring plan employed.

- Monitoring Plan. The permittee will submit a monitoring plan with the proposed monitoring sites and at least two alternate monitoring locations for each site. The plan must include maps of the drainage and storm drain data for each proposed and alternate monitoring location. The monitoring plan(s) will be submitted to the Regional Board within 30 days after receipt of the Executive Officer's letter requesting such a plan. Such a request is authorized pursuant to Section 13267 of the Porter-Cologne. The Regional Board's Executive Officer will have full authority to review the monitoring plan(s), to modify the plan, to select among the alternate monitoring sites, and to approve or disapprove the plan(s).

- Jurisdiction. While each city, and Los Angeles County for non-incorporated areas, will receive an allocation based on the trash generation factors for its land uses, the areas not regulated under municipal or industrial storm water permits may be permitted separately. For this reason, each city must provide the Regional Board with a list of entities located within their municipal boundaries that are outside of their jurisdiction including state or federal lands and facilities, within 120 days of the effective date of this TMDL. The Regional Board will review the lists of state and federal entities and issue permits as warranted.

- Data Collection. Baseline data will be collected over a period of at least two years. Although the amount of trash deposited into the waterways through the conveyance of a storm drain is dependent on rainfall patterns, and larger amounts of trash are typically deposited into the channels as a result of the first storm of the season, monitoring will include dates in both the rainy season and the dry season. The Los Angeles County Department of Public Works defines the rainy season as spanning from October 15 to April 15. In the event that precipitation during the two years of Baseline Monitoring is below average, the permittees may elect to extend the monitoring plan for another two years. However, an extension of the Baseline Monitoring program, shall not cause a delay in the commencement of the Implementation Plan as described in Section VIII.

- Unit of Measure. Data will be reported in a single unit of measure that is reproduceable and measures the amount of trash, irrespective of water content (e.g., compacted volume based on a standardized compaction rate, dry weight, etc.). The permittees may select the unit, but all permittees must use the same unit of measure. The unit of measure used during Baseline Monitoring also will be used during Implementation for determining compliance with Waste Load Allocations.

- Sampling Frequency. During wet weather, all sampling devices will be emptied within 72 hours of every precipitation event of 0.25 inch. During dry weather, sampling devices will be emptied and analyzed every three months in the absence of precipitation.

- Vegetation. The permittees may exclude vegetation from their reported discharge except where there is evidence that the vegetation is the result of the illegal discharge of yard waste. However, all monitoring data must be reported uniformly (either with or without vegetation). If the permittees include vegetation in the discharges reported during Baseline Monitoring, they will be obligated to include natural vegetation in their reports of discharge during Implementation.

- Disposal of Collected Trash. Trash captured during the monitoring program must be disposed of in accordance with all applicable laws and regulations.

A summary of the requirements and milestone dates related to the Baseline Monitoring Program are summarized in Table 6.

Table 6. Baseline Monitoring Plan Due Dates.

30 days after receipt of the Executive Officer's request as authorized by Section 13267 of Porter-Cologne.	Submit baseline monitoring plan(s).
120 days after receipt of the Executive Officer's request as authorized by Section 13267 of Porter-Cologne.	List facilities that are outside of the permittee's jurisdiction but drain to a portion of the the permittee's storm drain system, which discharges to the Los Angeles River.
First 2 years after approval of this amendment; to be extended to 4 years at the option of the Permittees	Collect Baseline Data
72 hours after each rain event	Clean out and measure trash retained
Every 3 months during dry weather	Clean out and measure trash retained

C. Baseline Monitoring Plan

During the first year of baseline monitoring, permittees or groups thereof will capture and quantify trash from an area of no less than 10% of the total land area over which they have jurisdiction and that drains to the Los Angeles River. The monitoring areas will also represent 10% of every land use the group has jurisdiction over. If storm drain configuration vs. land use make the representation of 10% of a land use unfeasible, the permittees or groups thereof can choose areas that their land uses as representatively as possible, as long as the extent of the surface being monitored represents 10%.

For the purposes of developing monitoring data for the establishment of Waste Load Allocations, the Regional Board will accept "full capture" as defined in Section II herein. This level of treatment will capture 100% of the trash mobilized by a one-year storm and nearly all of the trash generated from a more intense storm. This is because most pollutants occur in the first flush of the runoff and would thus be intercepted by a structural treatment device prior to the crest of the runoff flow resulting from a more intense storm.

D. Alternative Baseline Monitoring Plan

For each land use monitored, a minimum of ten representative sites will be sampled. For each sampling site, a minimum of five catch basins will be fitted with inserts, for a total of not less than 50 catch basin inserts per land use monitored. The existing litter removal practices that are employed by the cities will remain in place, so that baseline monitoring will evaluate how much trash is washed into the system under current practices.

In addition, the Regional Board will require a structural, full capture device downstream of at least one sampling site for each land use monitored. For this sampling site, all of the catch basins that are upstream of the full capture-monitoring device must be fitted with inserts. This configuration will provide information on the relative effectiveness of the catch basin inserts as opposed to the full capture systems in varying land uses and under varying weather conditions.

VIII. Implementation and Compliance

As required by the Clean Water Act, discharges of pollutants to surface waters from storm water are prohibited, unless the discharges are in compliance with a National Pollutant Discharge Elimination System (NPDES) Permit. Discharge of trash to the Los Angeles River will be regulated via the Municipal NPDES Storm Water Permits and the Caltrans stormwater permit. In addition, USEPA Phase II stormwater permits, general permits, and industrial permits may also be used to regulate discharges of trash to the river.

In June 1990, the first Municipal NPDES Storm Water Permit was issued jointly to Los Angeles County and 84 cities as co-permittees. A separate NPDES Storm Water Permit was issued to the City of Long Beach on June 30, 1999. Storm water municipal permits will be one of the implementation tools of this Trash TMDL, and will include the allocations as effluent limits. Thus, future storm water permits will be modified to incorporate the Waste Load Allocations and to address monitoring and implementation of this TMDL.

A. Compliance Determination

During the Baseline Monitoring Program that occurs prior to the commencement of the Implementation Phase, cities will be deemed in compliance with the Waste Load Allocations provided that all of the trash collected during the monitoring program is disposed of in compliance with all applicable regulations. Thereafter, compliance with the Waste Load Allocations will be calculated as a running three-year average. Other measures of compliance will relate to the implementation and reporting as required under the approved Baseline Monitoring Program.

The first compliance point during the Implementation Phase will be September 30, 2006. Compliance will be evaluated based on the total load discharged to the river during the period October 1, 2003 through September 30, 2006, divided by three. Compliance thereafter will be evaluated at the end of each successive storm season and will be based on a rolling three-year average (see Table 7). This method will provide allowances for variability due to rainfall. Exceedance of the 3-year rolling average discharge will subject the permittee to enforcement action. A summary of the schedule for determining compliance with the Waste Load Allocations is presented in Table 7.

The final waste load allocation will be considered complied with when the Executive Officer finds that:

1. Structural devices or systems and/or institutional controls have removed effectively 100% of the trash from the storm drain system discharge to Los Angeles River or its tributaries or

2. Structural devices or systems, and/or institutional controls have removed a minimum of 95 % of the trash baseline load from the storm drain system discharge to the Los Angeles River or its tributaries and in-stream devices or systems are in place to remove effectively 100% of trash prior to reaching the soft-bottomed segments of the Los Angeles River or its tributaries and the Long Beach Harbor.

Table 7. Compliance Schedule.
(Default waste load allocations expressed as cubic feet of uncompressed trash and % reduction.)

Year	Baseline Monitoring/ Implementation	Waste Load Allocation	Compliance Point
1	Baseline Monitoring	No allocation specified. Trash will be reduced by levels collected during the baseline monitoring program.	Achieved through timely compliance with baseline monitoring program.
2	Baseline Monitoring	No allocation specified. Trash will be reduced by levels collected during the baseline monitoring program.	Achieved through timely compliance with baseline monitoring program.
3 10/1/03-- 9/30/04	Baseline Monitoring (optional)/ Implementation: Year 1	90% (44,212.1 for the Municipal permittees, 7150.0 for Caltrans)	No compliance point (target of 90%).
4 10/1/04-- 9/30/05	Baseline Monitoring (optional)/ Implementation: Year 2.	80% (39,299.7 for the Municipal permittees, 6,355.6 for Caltrans)	No compliance point (target of 80%).
5 10/1/05-- 9/30/06	Implementation: Year 3	70% (34,387.2 for the Municipal permittees, 5,561.1 for Caltrans)	Compliance is 80% of the baseline load calculated as a rolling 3-year annual average (39,299.7 for the Municipal permittees, 6,355.6 for Caltrans).
6 10/1/06-- 9/30/07	Implementation: Year 4	60% (29,474.8 for the Municipal permittees, 4,766.7 for Caltrans)	70% of the baseline load the baseline load calculated as a rolling 3-year annual average (34,387.2 for the Municipal permittees, 5,561.1 for Caltrans).
7 10/1/07-- 9/30/08	Implementation: Year 5	50% (24,562.3 for the Municipal permittees, 3,972.2 for Caltrans)	60% of the baseline load calculated as a rolling 3-year annual average (29,474.8 for the Municipal permittees, 4,766.7 for Caltrans).
8 10/1/08-- 9/30/09	Implementation:Year 6	40% (19,649.8 for the Municipal permittees, 3,177.8 for Caltrans)	50% of the baseline load calculated as a rolling 3-year annual average (24,562.3 for the Municipal permittees, 3,972.2 for Caltrans).
9 10/1/09-- 9/30/10	Implementation: Year 7	30% (14,737.4 for the Municipal permittees, 2,383.3 for Caltrans)	40% of the baseline load calculated as a rolling 3-year annual average (19,649.8 for the Municipal permittees, 3177.8 for Caltrans).
10 10/1/10-- 9/30/11	Implementation: Year 8	20% (9,824.9 for the Municipal permittees, 1,588.9 for Caltrans)	30% of the baseline load calculated as a rolling 3-year annual average (14,737.4 for the Municipal permittees , 2,383.3 for Caltrans).
11 10/1/11-- 9/30/12	Implementation: Year 9[49]	10% (4,912.5 for the Municipal permittees, 794.4 for Caltrans)	20% of the baseline load calculated as a rolling 3-year annual average (9,824.9 for the Municipal permittees, 1,588.9 for Caltrans).
12 10/1/12-- 9/30/13	Implementation: Year 10	0 or 0 % of the baseline load OR 5 % (2,456.2 for the Municipal permittees, 397.2 for Caltrans) of the baseline load and in-stream removal of effectively 100% of the trash before reaching the soft-bottomed portions of the Los Angeles River or its tributaries and before reaching the Long Beach Harbor.	10% of the baseline load as determined calculated as a rolling 3-year annual average (4,912.5) for the Municipal permittees, 794.4 for Caltrans) OR 11.6% of the baseline load allocation (5,698.5 for the Municipal permittees, 921.5 for Caltrans) and in-stream removal of effectively 100% of trash before reaching the soft-bottomed portions of the Los Angeles River or its tributaries and before the Long Beach Harbor.

[49] A review of the current target will be allowed once a reduction of 50% has been achieved and sustained.

Year	Baseline Monitoring/ Implementation	Waste Load Allocation	Compliance Point
13 10/1/13-- 9/30/14	Implementation: Year 11	0 or 0 % of the baseline load OR 5 % of the baseline load allocation (2,456.2 for the Municipal permittees, 397.2 for Caltrans) and in-stream removal of effectively 100% of trash before reaching the soft-bottomed portions of the Los Angeles River or its tributaries and before reaching the Long Beach Harbor.	3.3 % of the baseline load as determined calculated as a rolling 3-year annual average (1,621.1 for the Municipal permittees, 262.2 for Caltrans) OR 6.7% of the baseline load allocation (3,291.3 for the Municipal permittees, 532.2 for Caltrans) and in-stream removal of effectively 100% of trash before reaching the soft-bottomed portions of the Los Angeles River or its tributaries and before reaching the Long Beach Harbor
14 10/1/14-- 9/30/15	Implementation: Year 12	0 or 0 % of the baseline load OR 5% of the baseline load allocation (2,456.2 for the Municipal permittees and 397.2 for Caltrans) and in-stream removal of effectively 100% of the trash before reaching the soft-bottomed portions of the Los Angeles River or its tributaries and before reaching the Long Beach Harbor.	0 or 0 % of the baseline load OR 5% of the baseline load allocation (2,456.2 for the Municipal permittees, 397.2 for Caltrans) and in-stream removal of effectively 100% of the trash before reaching the soft-bottomed portions of the Los Angles River or its tributaries or before reaching the Long Beach Harbor.

B. Compliance Strategies

Permittees may employ a variety of strategies to meet the progressive reductions in their Waste Load Allocations. These strategies may be broadly classified as either:

- End-of-pipe full capture structural controls or
- Partial capture control systems and/or
- Institutional controls.

A permittee could comply with the successive reduction in Waste Load Allocations by installing full capture devices progressively throughout the watershed until all of the outlets to the Los Angeles River system are covered. This approach may be best suited for open space areas, where low levels of trash may accumulate over large vegetated drainage areas. However, in more urban settings, institutional controls including enforcement of litter laws and more frequent street sweeping may be preferred.

It is to be noted that ordinances that prohibit litter are already in place in most cities. For example, the Los Angeles City Code of Regulations recognizes that trash becomes a pollutant in the storm drain system when exposed to storm water or any runoff and prohibits the disposal of trash on public land:

> No person shall throw, deposit, leave, cause or permit to be thrown, deposited, placed, or left, any refuse, rubbish, garbage, or other discarded or abandoned objects, articles, and accumulations, in or upon any street, gutter, alley, sidewalk, storm drain, inlet, catch basin, conduit or other drainage structures, business place, or upon any public or private lot of land in the City so that such

materials, when exposed to storm water or any runoff, become a pollutant in the storm drain system. (City Code of Regulations, §64.70.02.C.1(a).)

Institutional controls provide several advantages over structural full capture systems. Foremost, institutional controls offer other societal benefits associated with reducing litter in our city streets, parks and other public areas. The capital investment required to implement institutional controls is generally less than for full-capture systems. However, the labor costs associated with institutional controls may be higher, and institutional controls may be more costly in the long-term.

There have been a number of discussions as to how permittees may best implement the gradual reductions required by this Trash TMDL, and as to the types of devices or best management practices they should elect. The permittees will be free to implement trash reduction in any manner that they choose.

A discussion of the means for determining compliance for various implementation strategies is presented in the following subsections.

1. Full Capture Treatment Systems

The amount of trash discharged to the river by an area serviced by a full-capture system will be considered to be in compliance with the final Waste Load Allocation for the drainage area, provided that the full capture systems are adequately sized, maintained and maintenance records are available for inspection by the Regional Board. Compliance with the final Waste Load Allocation will be assumed, for full capture systems with a design treatment capacity of not less than the peak flow resulting from a one-year storm ~~sized for a storm intensity of~~ (determined to be 0.6 inch of rain per hour for the Los Angeles River Watershed).

The Permittees may employ devices or systems other than the vortex separation system to meet the final Waste Load Allocations. However, such systems must be approved by the Executive Officer to attain removal credit. Before approving a full-capture system, the Executive Officer must make the following findings:

- The device or system will capture all particles retained by a 5 mm mesh screen from all runoff generated from a one-year storm (determined to be 0.6 inch per hour) and

- The device or system is designed to prevent plugging or blockage of the screening module.

2. Partial Capture Treatment Systems and Institutional Controls

Measuring the effectiveness of partial-capture systems and institutional controls is more complicated. The discharge resulting from an area addressed by partial capture and/or institutional controls will be estimated using a mass balance approach, based on the daily generation rate (DGR) for the specific area. [Note: The DGR should not be confused with the trash generation rates obtained during baseline monitoring. The baseline monitoring program is designed to obtain "typical" trash generation rates for a given land use. Those values are then used to calculate a Permittee's baseline load allocation. The DGR is the average amount of trash deposited within a specified drainage area over a 24-hour period. The DGR will be used in a mass balance equation to estimate the amount of trash discharged during a rain event.] (See Example 1.)

Annual re-calculation of the DGR will serve as a measure of the effectiveness of source reduction measures including public education, enforcement of litter laws, etc. Source reduction measures will be accredited based on an annual recalculation of the DGR to allow for progressive improvement and/or to account for backsliding.

The DGR will be determined from direct measurement of trash deposited in the drainage area during the month of July[50], and re-calculated every year thereafter. July was assumed to be a month characterized by high outdoor activity when trash is most likely to be deposited on the ground. The recommended method for measuring trash during this time period is to close the catch basins in a manner that prevents trash from being swept into the catch basins and then to collect trash on the ground via street sweeping, manual pickup, or other comparable means. The DGR will be calculated as the total amount of trash collected during the month divided by 31 (the number of days in the month).

Accounting of DGR and trash removal via street sweeping, catch basin clean outs, etc. will be tracked in a central spreadsheet or database to facilitate the calculation of discharge for each rain event. The spreadsheet and/or database will be available to the Regional Board for inspection during normal working hours. The database/spreadsheet system will allow for the computation of calculated discharges and can be coordinated with enforcement. This database will be developed by cities or groups of cities.

The Executive Officer may approve alternative compliance monitoring programs other than those described above, upon finding that the program will provide a scientifically-based estimate of the amount of trash discharged from the storm drain system.

Should the Co-Permittees select in-stream trash removal as a means to comply with the final Waste Load Allocation, an in-stream monitoring plan must be submitted to and approved by the Executive Officer.

3. Examples of Implementation Strategies

Two example control strategies for municipal stormwater discharges are described in this section.

Example 1.

A permittee installs catch basin inserts and "dry weather trash door" devices of the type that maintains the catch basin shut during dry weather, and implements regular street

[50] Provided no special events are schedule that may affect the representativity of that month.

sweeping. After each storm of 0.25 inch or greater, the catch basin inserts are emptied. In this case, the DGR was calculated during the month of July as follows:.[51]

DGR = (Volume of trash collected via street sweeping during the month of Julyg / 31 days.)

The stormwater discharge for a given rain event then would be calculated by multiplying the number of days since the last street sweeping by the DGR and subtracting the volume of trash recovered in the catch basin inserts.

Stormwater Discharge = [(Days since last street sweeping) (DGR)] –
[Volume of trash recovered from catch basin inserts]

Example 2.

City X is comprised of three land use areas (Land Uses A, B, and C). The city has adopted an implementation strategy using a combination of full capture structural and institutional controls. As of year five, the city has installed full capture structural controls in Area A and institutional controls in Area B. City X has not yet taken any action to control trash in Area C. The watershed-wide baseline Waste Load Allocation have been established at 100 lbs per square mile for Land Uses A and B, and at 200 lbs per square mile for land use C. The full capture treatment system is assumed to meet the final Waste Load Allocation. The city's mass balance calculations show that 100 lbs of trash was discharged from Land Use Area B. The discharge from Land Use Area C is assumed to be the base load allocation since no controls were implemented and the daily generation rate has not been established. As shown in Figure D, City X's discharge for the year was 1,100 lbs, and the 3-year rolling average discharge was less than the 5-Year Waste Load Allocation. Therefore the city was found to be in compliance with its discharge loading unit.

[51] In the event that trash generation rates differ between weekday and weekends, a distinction in the DGRs may be warranted.

Land Use A:
10 sq miles treated by a full capture system

Baseline Waste Load Allocation:

100 lbs/sq mi/year

Land Use B:
5 sq miles treated via institutional controls and partial capture

Baseline Waste Load Allocation:
100 lbs/sq mi/year

Land Use C:
5 sq miles - No treatment applied

Baseline Waste Load Allocation:
200 lbs/sq mi/year

<u>Baseline Waste Load Allocation for each land use in City X</u>:
A=(100 lbs/sq mi/yr) (10 sq mi)=1000 lbs
B=(100 lbs/sq mi/yr) (5 sq mi)=500 lbs
C=(200 lbs/sq mi/yr) (5 sq mi)=1000 lbs
Total baseline Waste Load Allocation = 2,500 lbs
Year 5 Waste Load Allocation = 2,000 lbs*
*An 80% reduction based on a 3-year rolling average.

<u>Previous Years' Discharge:</u>
Year 3 = 2,400 lbs
Year 4 = 2,000 lbs

<u>Trash Discharge for Year 5</u>:
A=0
B=100 lbs (Determined by mass balance)
C=1,000 lbs (No reduction)
Total Discharge (Year 5) = 1,100 lbs

<u>Three-Year Rolling Average Discharge</u>
Year 3 = 2,400 lbs
Year 4 = 2,000 lbs
Year 5 = 1,100 lbs
3-year rolling average discharge = 1,833 lbs

Compliance is achieved: Discharge (1,833 lbs) < Waste Load Allocation (2,000 lbs).

Figure D. Example 2, City X After Year 5.

A summary of implementation strategies and compliance assurance methods is provided in Table 8.

Table 8. Summary of Possible Trash Reduction Implementation Measures.

Treatment Applied	Measure of Effectiveness	Compliance Determination
Source Control: Public education, enforcement of litter laws, container redemption programs, etc.	Daily Generation Rate: Amount of trash collected via street sweeping and or from catch basin inserts divided by the number of days provides a measure of source control measure effectiveness	DGR used in mass balance calculation of discharge: Discharge = [DGR (x) Days since last street sweeping] (-) [Catch basin cleanouts]
Partial Capture: (Catchbasin inserts, trash excluder doors, etc.)	Mass Balance: Discharge = [DGR (x) Days since last street sweeping] (-) [Catch basin cleanouts] OR Downstream Monitoring w/ Full Capture System	Discharge based on mass balance calculation: Discharge = [DGR (x) Days since last street sweeping] (-) [Catch basin cleanouts] OR Monitoring Results
Full Capture: Capture 100% of particles retained by a 5 mm mesh screen. from flow resulting from 0.6 inches rain/hr	Effectiveness verified by literature	Final Waste Load Allocation Achieved: Provided system is adequately sized, maintained and maintenance records are available for Regional Board inspection

IX. Cost Considerations

The Porter-Cologne Section 13241(d), requires staff to "consider costs" associated with the establishment of water quality objectives. The TMDL does not establish water quality objectives, but is merely a plan for achieving the existing water quality objective. Therefore cost considerations required in Section 13241 are not required for this TMDL.

The purpose of this cost analysis is to provide the Regional Board with information concerning the potential cost of implementing this TMDL and to addresses concerns about costs that have been raised by stakeholders. This section takes into account a reasonable range of economic factors in fulfillment of the applicable provisions of the California Environmental Quality Act (Public Resources Code Section 21159.)

An evaluation of the costs of implementing this Trash TMDL amounts to evaluating the costs of preventing trash from getting from the storm drains to the river. This brief report gives a summary overview of the costs associated with the most likely ways the permittees will achieve the required reduction in discharges to the storm drain system. Such an analysis would be incomplete if it failed to consider the existing cost that presently is transferred to "innocent" downstream communities. Approximately 1,620 tons of litter are estimated to be discharged to the Los Angeles River annually, requiring costly removal measures. In addition there is an unquantified cost to aquatic life within the River and the Ocean.

The Regional Board has some information about various facets of the costs of preventing trash from getting into the storm drains. However, exact information on infrastructure currently in place and current structural projects being undertaken is currently not available to the Board. Furthermore, lack of complete information on existing costs precludes a comparison between costs of compliance with existing costs.

A. Current Cost of Trash Clean-Ups

Cleaning up the river, its tributaries and the beaches is a costly endeavor. The Los Angeles County Department of Public Works contracts out the cleaning of over 75,000 catchments (catch basins) for a total cost of slightly over $1 million per year, billed to 42 municipalities. Each catch basin is cleaned once a year before the rainy season, except for 1,700 priority catch basins that fill faster and have to be cleaned out more frequently.

Over 4,000 tons of trash are collected from Los Angeles County beaches annually, at a cost of $3.6 million to Santa Monica Bay communities in fiscal year 1988-89 alone. In 1994 the annual cost to clean the 31 miles of beaches (19 beaches) along Los Angeles County was $4,157,388.

Long Beach bears a large part of the financial burden for cleaning up trash from the Los Angeles River watershed, which is disproportionate to the amount actually produced by this city.[52] The costs of gathering and disposing of trash at the mouth of the Los Angeles River during the rainy season are listed on Table 9.

Table 9. Storm Debris Summary for Long Beach: Billings.[53]

	First Quarter (July-Sept.)	Second Quarter (Oct.-Dec.)	Third Quarter (Jan.-March)	Fourth Quarter (April-June)	Total
1995-96	$44,152[54]	$130,986	$224,023	$126,416	$525,577
1996-97	$102,055	$187,344	$88,180	$122,416	$499,995
1997-98	$158,612	$268,594	$282,988	$169,340	$879,534
1998-99	$247,986	$198,147	$185,179	$246,950	$878,262

[52] However, the cost to the City of Long Beach is offset somewhat by an annual reimbursement from Los Angeles County in the amount of $500,000. (Written comment from The City of Los Angeles, June 23, 2000.)
[53] Memorandum from Geoffrey Hall; City of Long Beach; Parks and Recreation.
[54] 9/95 only.

B. Cost of Implementing Trash TMDL

The cost of implementing this TMDL will range widely, depending on the method that the Permittees select to meet the Waste Load Allocations. Arguably, enforcement of existing litter ordinances could be used to achieve the final Waste Load Allocations at minimal or no additional cost. The most costly approach in the short-term is the installation of full-capture structural treatment devices on all discharges to the river. However, in the long term this approach would result in lower labor costs and may be less expensive than some other approaches.

Most of the information presented herein consists of catch basin inserts, structural vortex separation devices and end of pipe nets. We are considering the costs associated with preventing the disposal of trash into the storm drain system over the whole watershed. For all calculations, the urbanized portions of the Los Angeles River watershed is assumed to span an area of 574 square miles[55].

Regardless of the method(s) used, costs associated with the gradual decrease of the amount of trash in the waterways, and the maintenance of the Los Angeles River and its tributaries free of trash include monitoring and implementation costs. Any device chosen for monitoring trash or removing trash from storm drain, regardless of its installation costs, will also be associated with labor costs.

We are looking at several methods separately, from retrofitting all the catch basins in the urbanized portion of the watershed, to using solely structural full capture methods.

1. Catch Basin Inserts

At a cost of around $800 per insert, catch basin inserts are the least expensive structural treatment device in the short term. However, because they are not a full capture method, they must be monitored frequently and must be used in conjunction with frequent street sweeping. We assumed that approximately 150,000 catch basins would have to be retrofitted with inserts to cover 574 square miles of the watershed. A summary of estimated costs for using catch basin inserts across the entire watershed is provided in Table 10.

Table 10. Costs of retrofitting the urban portion of the watershed with catch basin inserts. (amounts in millions)

Number of years into the program	1	2	3	4	5	6	7	8	9	10	11	12
Operation & Maintenance costs (yearly, cumulative)	$6	$12	$18	$24	$30	$36	$42	$48	$54	$60	$60	$60
Capital costs (yearly)	$12	$12	$12	$12	$12	$12	$12	$12	$12	$12	$00	$00
Costs per year (servicing + capital costs)	$18	$24	$30	$36	$42	$48	$54	$60	$66	$72	$60	$60

[55] Although the urbanized portion of the watershed is 584 square miles, about 10 square miles are covered with water.

The total capital costs required for retrofitting the whole watershed would be $120 million, while the yearly maintenance costs after full implementation would be $60 million.

2. Full Capture Vortex Separation Systems (VSS)

Permanent structural devices can be used to trap gross pollutants for monitoring purposes as well as implementation. Among those "litter control devices" are structural vortex separation systems (VSS), floating debris traps, end-of-pipe nets and trash racks. VSS units appear to be among the best alternatives to evaluate or remove the amount of trash generated throughout a particular drainage area.

An ideal way to capture trash deposited into a stormdrain system would be to install a VSS unit. This device diverts the incoming flow of stormwater and pollutants into a pollutant separation and containment chamber. Solids within the separation chamber are kept in continuous motion, and are prevented from blocking the screen so that water can pass through the screen and flow downstream. This is a permanent device that can be retrofitted for oil separation as well. Studies have shown that VSS systems remove virtually all of the trash contained in the treated water. The cost of installing a VSS is assumed to be high, so limited funds will place a cap on the number of units which can be installed during any single fiscal year.

Table 11 shows estimated costs associated with retrofitting the watershed with low capacity vortex separation systems progressively over ten years.

Table 11. Costs Associated with Low Capacity Vortex Gross Pollutant Separation Systems.
(amounts in millions)

Number of years into the program	1	2	3	4	5	6	7	8	9	10	11	12
Operations and Maintenance (yearly, cumulative)	$14.8	$29.5	$44.3	59.1	$73.9	$88.6	$103.4	118.2	$132.9	$147.7	$147.7	$147.7
Capital costs (yearly)	$94.5	$94.5	$94.5	$94.5	$94.5	$94.5	$94.5	$94.5	$94.5	$94.5	$0.0	$0.0
Annual costs per year (capital costs + Operation and Maintenance)	$109.3	$124.1	$138.8	$153.6	$168.4	$183.2	$197.9	$212.7	$227.5	$242.2	$147.7	$147.7

Similarly, Table 12 provides estimates of costs associated with the installation of large capacity VSS systems.

Table 12. Costs Associated with Large Capacity Vortex Gross Pollutant Separation Systems. (amounts in millions)

Number of years into the program	1	2	3	4	5	6	7	8	9	10	11	12
Operations and Maintenance (yearly, cumulative)	$0.7	$1.5	$2.2	$3.0	$3.7	$4.4	$5.2	$5.9	$6.6	$7.4	$7.4	$7.4
Capital costs (yearly)	$33.2	$33.2	$33.2	$33.2	$33.2	$33.2	$33.2	$33.2	$33.2	$33.2	$0.0	$0.0
Annual costs per year (capital costs + Operation and Maintenance)	$34.0	$34.7	$35.5	$36.2	$36.9	$37.7	$38.4	$39.1	$39.9	$40.6	$7.4	$7.4

As shown in Table 13, outfitting a large drainage with a number of large VSS systems may be less costly than using a larger number of small VSS systems. Maintenance costs decrease dramatically as the size of the system increases. Topographical and geotechnical considerations also should come into play when choosing VSS systems or other structural devices.

Table 13. Costs Associated with VSS.

Capacity	Acres (average)	Number of devices needed on urban portion of watershed	Capital costs	Yearly costs for servicing all devices
1 to 2 cfs	5	73,856	$945,356,800	$147,712,000
6 to 8 cfs	30	12,309	$553,920,000	$24,618,000
19 to 24 cfs	100	3,693	$332,352,000	$7,386,000

For this table, we have assumed the cost of yearly servicing of a VSS unit to be $2000 per year.

3. End of Pipe Nets

"Release nets" are a relatively economical way to monitor trash loads from municipal drainage systems. However, in general they can only be used to monitor or intercept trash at the end of a pipe and are considered to be partial capture systems, as the nets are usually sized at a 1/2" to 1" mesh. These nets are attached to the end of pipe systems. The nets remain in place on the end of the drains until water levels upstream of the net rise sufficiently to release a catch that holds the net in place. The water level may rise from either the bag being too full to allow sufficient water to pass, or from a disturbance during very high flows. When the nets release they are attached to the side of the pipe by a steel cable and as they are washed downstream (a yard or so) are tethered off so that no pollutants from within the bags are washed out.

Preliminary observations suggest that the nets rarely fill sufficiently to cause the bags to release. And therefore, if they are cleaned after a storm event, the entire quantity of material is captured and can be measured for monitoring purposes using two bags per trap. This makes it easy to replace the full or partially full bag with an empty one, so that the first bag can be taken to a laboratory for analysis without manual handling of the material it contains.

The net are valid devices because of the ease of maintenance and also because the devices can be relocated after a set period at one location (provided the pipe diameters are the same). With limited funding, installation could be spread over several land uses and lead to valuable monitoring results.

Because the devices require attachment to the end of a pipe, this can severely reduce the number of locations within a drainage system that can be monitored. In addition, these nets cannot be installed on very large channels (7 feet in diameter is the maximum), while the largest outlets into the Los Angeles River are 10 feet in diameter. Thus costs shown in Table 14 are given per pipe, and no drainage coverage is given.

Table 14. Sample Costs for End of Pipe Nets.

Pipe Size	Release nets (cost estimates)
End of 3 ft pipe	$10,000
End of 4 ft pipe	$15,000
End of 5 ft pipe	$20,000
In 3 ft pipe network	$40,000
In 4 ft pipe network	$60,000
In 5 ft pipe network	$80,000

4. Cost Comparison

A comparison of costs between strategies based on catch basin inserts (CBIs), low capacity VSS, high capacity VSS systems, and enforcement of litter laws is presented in Table 15.

Table 15. Cost Comparison (amounts in millions)

	CBI only	Low capacity VSS Units	Large capacity VSS Units	Enforcement of Litter Laws[56]
Cumulative capital costs over 10 years	$120	$945	$332	<$1
Cumulative maintenance and capital costs after 10 years	$450	$1,758	$373	<$1
Annual servicing costs after full implementation	$60	$148	$7.4	<$1

Trash abatement in the Los Angeles River system may be expensive; the costs will differ depending on the options selected by the permittees.

[56] Revenues from fines assessed to offset increased law enforcement cost. The cost of a database system used to calculate trash discharges estimated to be less than $250,000.

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Appendix I

This table shows the square mileage for "high density residential", "low density residential", "commercial and services", "industrial", "public facilities", "educational institutions", "military institutions", "transportation and utilities", "mixed urban", "open space and recreation", "agriculture" and "water" land uses for every city and incorporated areas in the watershed. The "water" land use of water is not in itself a source of trash, and will therefore not receive an allocation. For cities that are only partially located on the watershed, the square mileage indicated is for the portion located in the watershed.

SQUARE MILEAGE ESTIMATED FOR EACH LAND USE FOR CITIES IN THE WATERSHED, AND FOR UNINCORPORATED AREAS.

City	High Density Residential	Low Density Residential	Commercial Services	Industrial	Public Facilities	Educational Institutions	Military Institutions	Transportation	Mixed Urban	Open Space & Recreation	Agriculture	Water	Total for all classes
Alhambra	5.11	0.03	0.84	0.33	0.24	0.29	0.00	0.39	0.04	0.35	0.00	0.00	**7.62**
Arcadia	6.56	0.98	1.18	0.20	0.22	0.22	0.00	0.22	0.11	1.01	0.00	0.17	**10.89**
Bell	1.20	0.00	0.28	0.44	0.20	0.06	0.04	0.22	0.05	0.01	0.00	0.25	**2.74**
Bell Gardens	1.37	0.00	0.31	0.25	0.04	0.16	0.00	0.03	0.04	0.11	0.10	0.02	**2.48**
Bradbury	0.01	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.27	0.17	0.00	**0.82**
Burbank	7.97	3.69	1.31	1.59	0.33	0.34	0.01	1.20	0.26	0.58	0.01	0.06	**17.36**
Calabasas	0.94	0.08	0.14	0.01	0.01	0.12	0.00	0.03	0.22	4.66	0.01	0.03	**6.27**
Carson	0.00	0.00	0.00	0.26	0.00	0.00	0.00	0.01	0.00	0.00	0.02	0.01	**0.30**
Commerce	0.64	0.00	0.57	3.84	0.15	0.05	0.00	0.91	0.15	0.11	0.12	0.02	**6.56**
Compton	4.30	0.22	0.79	1.99	0.15	0.72	0.02	0.63	0.16	0.12	0.08	0.05	**9.37**
Cudahy	0.78	0.00	0.09	0.04	0.01	0.05	0.00	0.00	0.00	0.02	0.00	0.02	**1.12**
Downey	4.10	0.02	0.59	0.07	0.45	0.24	0.00	0.07	0.05	0.42	0.00	0.10	**6.10**
Duarte	0.64	0.00	0.15	0.13	0.24	0.05	0.00	0.08	0.06	0.67	0.00	0.01	**2.04**
El Monte	4.27	0.01	1.06	0.97	0.18	0.32	0.00	0.40	0.09	0.06	0.00	0.17	**7.56**
Glendale	12.69	6.74	1.86	0.87	1.00	0.38	0.01	0.57	0.22	6.05	0.03	0.13	**30.65**
Hidden Hills	0.02	1.14	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.25	0.01	0.00	**1.47**
Huntington Park	1.61	0.00	0.51	0.52	0.04	0.13	0.00	0.12	0.02	0.07	0.00	0.00	**3.03**
Irwindale	0.02	0.01	0.00	0.73	0.16	0.01	0.00	0.13	0.06	0.05	0.00	0.67	**1.84**

SQUARE MILEAGE ESTIMATED FOR EACH LAND USE FOR CITIES IN THE WATERSHED, AND FOR UNINCORPORATED AREAS, CONTINUED.

City	High Density Residential	Low Density Residential	Commercial Services	Industrial	Public Facilities	Educational Institutions	Military Institutions	Transportation	Mixed Urban	Open Space & Recreation	Agriculture	Water	Total for all classes
La Canada Flintridge	2.99	2.02	0.18	0.15	0.24	0.16	0.00	0.22	0.02	2.56	0.05	0.04	**8.65**
Lakewood	0.15	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	**0.17**
Long Beach	11.98	0.02	2.39	1.46	0.74	0.58	0.01	1.04	0.43	0.98	0.26	0.79	**20.70**
Los Angeles	134.12	13.04	16.84	18.69	8.45	7.97	0.13	11.66	4.28	66.02	3.07	5.06	**290.43**
Lynwood	3.00	0.00	0.51	0.44	0.10	0.20	0.00	0.48	0.06	0.07	0.00	0.00	**4.86**
Maywood	0.86	0.00	0.16	0.10	0.00	0.03	0.00	0.00	0.01	0.01	0.00	0.00	**1.17**
Monrovia	3.25	0.29	0.48	0.58	0.14	0.16	0.00	0.14	0.10	7.27	0.04	0.11	**12.55**
Montebello	3.82	0.00	0.68	1.64	0.35	0.36	0.00	0.29	0.18	0.62	0.15	0.20	**8.36**
Monterey Park	4.60	0.00	0.64	0.28	0.44	0.27	0.00	0.20	0.06	0.95	0.23	0.00	**7.67**
Paramount	1.30	0.00	0.17	0.95	0.07	0.10	0.00	0.25	0.08	0.07	0.15	0.12	**3.26**
Pasadena	11.50	1.70	2.24	0.52	0.90	0.96	0.02	0.91	0.10	4.02	0.12	0.25	**23.22**
Pico Rivera	1.03	0.00	0.23	0.51	0.05	0.03	0.00	0.10	0.03	0.10	0.01	0.91	**3.00**
Rosemead	3.32	0.00	0.73	0.13	0.14	0.26	0.00	0.17	0.08	0.15	0.15	0.01	**5.14**
San Fernando	1.43	0.00	0.41	0.28	0.09	0.10	0.00	0.01	0.01	0.04	0.00	0.04	**2.42**
San Gabriel	2.90	0.01	0.49	0.10	0.08	0.15	0.00	0.05	0.02	0.23	0.09	0.00	**4.13**
San Marino	2.02	1.05	0.07	0.00	0.09	0.11	0.00	0.09	0.00	0.32	0.00	0.00	**3.77**
Santa Clarita	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	**0.06**
Sierra Madre	1.71	0.06	0.05	0.01	0.06	0.06	0.00	0.00	0.02	0.98	0.01	0.05	**3.01**
Signal Hill	0.30	0.00	0.06	0.63	0.06	0.03	0.00	0.00	0.00	0.00	0.00	0.00	**1.10**
Simi Valley	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	**0.02**
South El Monte	0.90	0.01	0.15	1.23	0.03	0.11	0.00	0.05	0.02	0.03	0.07	0.02	**2.62**
South Gate	3.97	0.00	0.76	1.11	0.21	0.16	0.00	0.35	0.25	0.23	0.15	0.20	**7.48**
South Pasadena	2.32	0.13	0.20	0.00	0.05	0.10	0.00	0.12	0.04	0.39	0.01	0.02	**3.43**
Temple City	3.43	0.01	0.27	0.07	0.08	0.12	0.00	0.00	0.00	0.03	0.01	0.00	**4.02**
Vernon	0.00	0.00	0.00	4.03	0.09	0.00	0.00	0.67	0.08	0.00	0.00	0.19	**5.06**
Unincorporated areas	17.04	1.65	2.05	2.86	0.68	0.80	0.02	1.28	0.22	12.28	0.46	0.58	**39.92**
Total for each land use watershedwise	**270.17**	**33.29**	**39.48**	**48.00**	**16.59**	**15.99**	**0.39**	**23.10**	**7.71**	**112.24**	**5.66**	**10.36**	**584.43**